

STORMS AND WEATHER WARNINGS.

WASHINGTON FORECAST DISTRICT.

Storm warnings.—A storm of decided intensity was central over eastern Minnesota and moving eastward at 8 p. m. of the 1st, with rapidly falling pressure to the eastward, and southwest storm warnings were ordered displayed at 10 p. m. from Delaware Breakwater to Eastport, Me. These warnings were fully verified, the highest velocity reported being 52 miles an hour from the southwest at Atlantic City, N. J.

At 8 p. m. of the 6th a disturbance of considerable intensity was centered over Georgia and it was followed by a decided rise in pressure over the west Gulf States. Northwest storm warnings were displayed at 10 p. m. from Jacksonville, Fla., to Fort Monroe, Va. The following morning they were extended northward to Boston, Mass., and at 9.30 p. m. to Eastport, Me. They were fully verified, several stations reporting maximum velocities in excess of 50 miles an hour.

Northeast storm warnings were ordered displayed at 2 p. m. of the 12th in connection with the very rapid movement of a disturbance from the middle Mississippi Valley to the lower Lake region. However, no verifying velocities were reported.

A disturbance that developed over the western Gulf of Mexico during the 14th was central near the Louisiana coast at 8 p. m. of that date with a strong area of high pressure to the northeastward. As it was expected that this disturbance would move rapidly northeastward with increasing intensity, northeast storm warnings were ordered displayed at 9.30 p. m. on the east Gulf coast from Bay St. Louis, Miss., to Cedar Keys, Fla., and on the Atlantic coast from Cape Hatteras to Sandy Hook, N. J. The following morning they were extended to include the entire Atlantic and east Gulf coasts. These warnings were fully verified.

On the 23d southwest storm warnings were ordered displayed on the Atlantic coast from Washington, N. C., to Eastport, Me., in connection with a disturbance of marked intensity that moved rapidly across the southern Lake region and down the St. Lawrence Valley. The warnings were fully verified.

At 10 a. m. of the 28th northeast storm warnings were displayed on the east Gulf coast from Bay St. Louis, Miss., to Cedar Keys, Fla., and at 10 p. m. on the Atlantic coast from Charleston, S. C., to Delaware Breakwater. At this time a disturbance was forming over the western Gulf of Mexico while a strong area of high pressure covered practically the entire United States. On March 1 the warnings were extended northward to Nantucket, Mass. These warnings were only partially verified on account of the disturbance failing to develop the intensity expected.

Advisory warnings of strong winds were sent to the open ports on Lake Michigan on the 1st, 2d, 10th, 11th, 12th, 17th, 19th, 21st, 22d, 23d, and 27th.

Cold-wave warnings.—There were no widespread cold waves in the Washington Forecast District during the month. However, cold-wave warnings were issued for limited areas on 11 days, the most important being as follows:

February 12.—For Indiana, western Kentucky, western Tennessee, and extreme northern Mississippi.

February 15.—For Kentucky, Tennessee, Alabama, Georgia, northern and central Florida, and the South Carolina coast.

February 16.—For New England, eastern New York, and northeastern Pennsylvania.

February 22-23.—The southern Lake region, the Ohio Valley, Tennessee, the east Gulf States, northern New England, and northern and central New York.

The warnings of the 15th and 16th were fully verified and the others only partially so.

Frost warnings.—Frost warnings were issued for Mississippi on the 6th and for the east Gulf and south Atlantic States as far south as the interior of southern Florida on the 7th, 8th, and 16th.—*Charles L. Mitchell.*

CHICAGO FORECAST DISTRICT.

The month was marked by frequent movement of low-pressure areas across the forecast district, but until near the close of the third week these disturbances were attended by light precipitation because they took a northerly route. On this account, also, the mean temperature was above normal for the month, except in the northwestern States where severe cold prevailed for a long period.

The first storm, which was attended by general precipitation and which took a middle route across the Chicago district, first appeared in the Pacific Coast Region on the 18th and 19th, reaching the Great Lakes region by the morning of the 23d, accompanied by rain, snow, and sleet, and shifting gales, and followed by a sharp fall in temperature. This storm only partially broke the prolonged drouth in the winter wheat section of the Southwest, as the resulting precipitation in portions of that area was inappreciable. The snowfall accompanying this storm was especially heavy in the upper Mississippi Valley and the northern Lake region, and at several points the snow was preceded by sleet, which, together with the high winds and following snowfall, raised havoc with railroad and other means of transportation, as well as telephone and telegraph lines. The storm was especially severe in Wisconsin and eastern Minnesota, and in the Northwestern States it had all the characteristics of a "blizzard"—gales, biting cold, and snow. Forecasts of snow, or rain turning to snow, with shifting gales were made for the entire area affected well in advance of the storm, but the ensuing damage was, nevertheless, most serious, and could not be avoided.

Cold-wave warnings were issued at various times during the month, but general warnings were confined to the period from the 10th to the 12th and again from the 21st to the 23d, and these were verified at nearly every station.

Advices were sent a number of times to the live-stock interests to protect the range cattle when high winds, low temperature, and precipitation were anticipated, and, as a consequence, it is believed that there was very little loss. Under date of February 23, the observer at Rapid City, S. Dak., writes as follows:

As I am sure western South Dakota will neglect to voice any appreciation of the weather forecaster who has saved herds of cattle the past three days. I take great pleasure in informing you that the forecasts were exceedingly accurate and the means of an enormous saving of live stock. Wide distribution was given the forecasts, and if there was any loss it was surely not the fault of the Weather Bureau service.

We had a "pippin" of a blizzard here on Wednesday night and Thursday. Wires are nearly all down to-day, and trains are annulled on account of cuts being filled with drifted snow.

Forecasts for a week in advance for Montana and North Dakota were sent each Monday to the Wenatchee

Valley Traffic Association, Wenatchee, Wash., with the view of protecting their fruit in shipment to the east; and forecasts for three or four days in advance were sent to various transportation interests throughout the West and Northwest. In response to the request of the *Reporter-Enterprise*, a weekly newspaper in Oconto, Wis., forecasts were sent to it each Thursday morning which included the period ending with the following Sunday.

There is constantly an increasing pressure for forecasts for several days in advance, and it is believed that those of that character that were issued during the month were fairly accurate and most acceptable to the recipients.—*H. J. Cox.*

NEW ORLEANS FORECAST DISTRICT.

Storm warnings were issued for the Texas coast on the 6th, 12th, 14th, 21st, 23d, and 28th, and on the Louisiana coast on the 6th, 15th, and 28th. The warnings were generally justified.

Cold-wave warnings were issued for northern and central Oklahoma and Bentonville, Ark., on the 1st, and they were partially justified. Cold-wave warnings were issued for Oklahoma and Bentonville, afternoon of the 11th, and extended on the 12th over Arkansas, northern Louisiana, the interior of east Texas, and the northern portion of west Texas. The high-pressure area moved eastward instead of southward and the warnings were verified only in the northern portion of the district. Cold-wave warnings were issued afternoon of the 21st for Oklahoma and Bentonville, Ark., were repeated and extended to the northern portion of the district on the morning of the 22d, and on the morning of the 23d the warnings were extended over Louisiana and repeated for the northeast and southwest portions of east Texas. An unusually intense cold wave made its appearance over the northern portion of the district on the 27th, and moved slowly southward, carrying freezing weather to the Gulf coast. Timely warnings were issued for this cold wave; the temperature fall in Louisiana and Arkansas was so gradual that the required fall in 24 hours was not reached.

Live-stock warnings were issued when conditions required such action.

Fire-weather warnings were issued for forest reservations in Arkansas and Oklahoma, February 21.—*I. M. Cline.*

DENVER FORECAST DISTRICT.

An unusually large number of low-pressure areas prevailed in the Denver Forecast District during February, 1922, and two South Pacific disturbances crossed the district in the third decade.

Cold-wave and live-stock warnings were issued for the eastern portions of Colorado and New Mexico on the morning of the 10th, an anticyclonic area, attended by temperatures below zero, having appeared over Alberta. The crest of the anticyclone moved eastward, however, and an area of low barometer from the North Pacific spread rapidly over the mountains, being central in southeastern Colorado by 8 p. m. of the 11th. The warnings were verified only in extreme eastern Colorado. On the morning of the 12th cold-wave warnings were issued for extreme northeastern Colorado and southeastern New Mexico. A further fall in temperature was reported in the former region and a cold wave occurred at Roswell. A disturbance appeared on the northern California coast on the morning of the 19th, moved slowly across the district, and by the 21st was over southwestern Utah. Twenty-four hours later it had

reached southeastern Colorado, while the crest of a marked high-pressure area was over Saskatchewan. Cold-wave and live-stock warnings were issued for eastern Colorado. The fall in temperature in eastern Colorado was more than 30° in localities, with zero temperatures in the greater part of the area.

The cold-wave warnings were extended to that portion of New Mexico east of the mountains on the morning of the 22d. On the morning of the 23d the front of the anticyclone had spread southward to eastern Colorado, and the warnings were repeated for southeastern Colorado and southeastern New Mexico. The temperatures in eastern Colorado were close to zero, at Roswell 12° above zero, and freezing temperature occurred at El Paso. Another anticyclonic area that appeared on the northeastern slope on the 26th spread southward rapidly, and cold-wave warnings were issued on the evening of the 27th for southeastern Colorado. A disturbance from the South Pacific, central in southwestern Utah, having increased in intensity, with a barometer reading of 29.52 inches, and readings of 30.9 inches being reported in eastern Montana, a cold-wave warning for northeastern New Mexico and live-stock and heavy snowfall warnings for Colorado, northern New Mexico, northern Arizona, and Utah were issued on the morning of the 27th. Snow fell in the areas indicated, except in extreme northern Utah, with moderate to heavy amounts in Colorado and parts of northern New Mexico, and was followed by a marked cold wave in nearly all of the area for which the warnings were issued. Zero temperatures were reported in eastern Colorado and temperatures close to zero in eastern New Mexico. A still further decline in temperature occurred on the morning of March 1, the temperatures in eastern Colorado ranging from 6° to 14° below zero at regular Weather Bureau stations and from 2° above to 2° below zero in eastern New Mexico and 6° to 10° above zero in Utah and northern Arizona.—*Frederick W. Brist.*

SAN FRANCISCO FORECAST DISTRICT.

The outstanding feature of the weather in this district during February, was the succession of depressions moving in from the Pacific at a low latitude.

The first and second decades gave almost continuous rain or snow in the northern portion of the district, while the southern portion was subjected to two well-marked rainy periods; the first from the 8th to the 11th in Nevada and California, and the second from the 16th to the 27th in Nevada and northern California and from the 20th to the 27th in southern California.

The temperature was somewhat below normal for the month in all sections, but there were no abnormally cold periods in any portion of the district.

Frost warnings were issued in northern California 10 times and in southern California 7 times. While no material damage resulted frosts occurred on every occasion, and the warnings were justified.

Storm warnings were ordered on 14 days as follows: On the Washington and Oregon coast 7 times, northern California coast 9 times, and southern California coast 5 times. The warnings were generally verified, and are all believed to have been justified, as vessel reports at the time showed gales at sea.

Radio reports from vessels at sea were very beneficial to the forecaster throughout the month. They kept him in fairly close touch with conditions off the coast and indicated the fact that the storms in most instances did not progress directly inland, but upon reaching the coast small portions would become detached from the main